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SEPARATE SEED PLACEMENT ATTACHMENT FOR FERTILIZER GRAIN DRILLS

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For years fertilizer grain drills have either placed the fertilizer in contact with the seed or in a separate band above the seed row. Numerous field tests, however, have shown that close-drilled crops emerge faster with better initial stands when the fertilizer is placed in a separate band below seed level. Since about 1958, grain drills with openers that place seed and fertilizer separately have become available from farm machinery manufacturers. Many of these openers, however, place the seed at the same depth as the fertilizer and separation is obtained by using different lateral positions of the two materials.

This report describes a device designed to provide separate placement of seed and fertilizer, positioning each at a different depth in the soil. Usually, the fertilizer is placed deeper than the seed.

The device is an attachment for a double-disk opener of standard design. It consists of a curved plate or "toe shield" that is attached to one side of the opener to form a depositor for the seed (fig. 1). This toe-shield attachment is mounted on the outside of the front half of the disk. It is adjustable in the vertical position from 1 to 3 inches above the bottom of the double disks. A metal tube extends upward from the toe-shield attachment, and the delivery hose from the seedbox is inserted into the tube. The hose from the fertilizer spout is inserted in the usual opening provided between the two disk blades of the double-disk opener.

The toe-shield attachment is made from the toe piece of the boot of a single-disk opener that has been slightly reshaped to fit the flat side of the straight disk. The other pieces of the attachment are made from standard sizes of steel and pipe stock.

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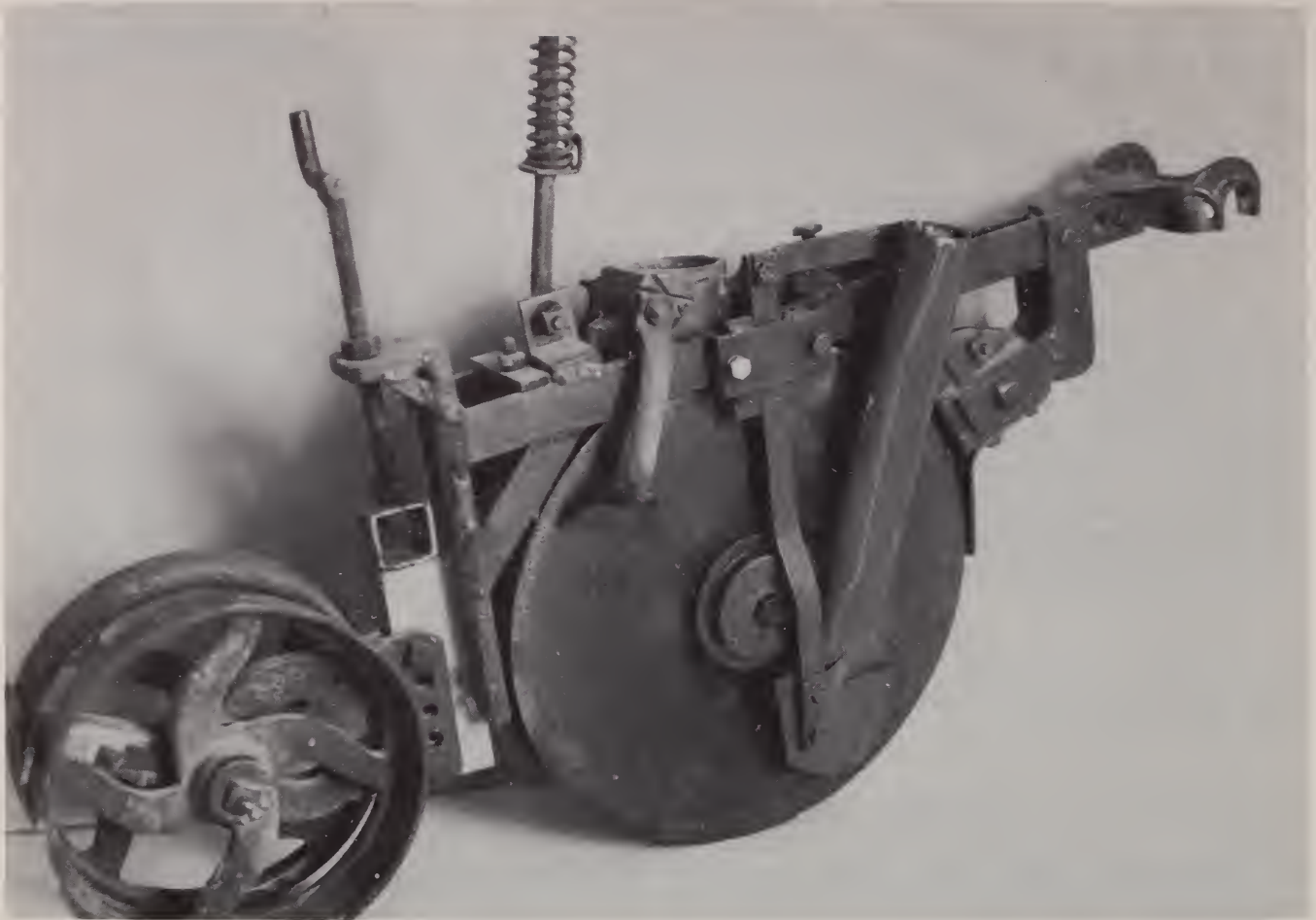


Figure 1. - A double-disk opener with "toe-shield" attachment mounted against the front portion of one disk to provide separation of seed and fertilizer in the soil.

This placement device has been used with certain crops in several South-eastern States on different soil types and has performed satisfactorily.

At Beltsville, Md., slow-motion moving pictures (128 frames per second) were made of performance tests where the toe shield was used in a friable soil with good moisture. They show considerable turbulence of seed in the soil before most of the seed settles in an area above the fertilizer band. Depth of the seed is quite varied; consequently, the toe-shield unit may be suitable for such seeds as small grains, whose emergence is not sensitive to seeding depth. Firming wheels of the commonly used downward-pressure type would probably be ineffective and impractical for use with this device. However, a press wheel in a narrow wedge shape (such as a V-shape) that would press the seed in an outward and downward direction might be effectively used with this opener.

Experiments were conducted at Blairsville, Ga., in 1961 and 1962 to compare the toe-shield attachment with the separate opener and contact method. Tables 1 and 2 show the effect of fertilizer position on seedling emergence and yield of Starr millet. A 9-27-27 fertilizer was applied at 300 pounds per acre and millet was seeded at 20 pounds per acre. Double-press wheels followed the double-disk openers to gage the depth of seed and fertilizer and to firm the soil.

Table 1.- The effect of seed and fertilizer placement on stand and yield of Starr millet on a Hayesville clay loam soil (upland) in 1961 1/

Fertilizer position with respect to seed	Estimated stand at 1 month	Yield of dry matter at 2 months, 1st clipping	Total yield of dry matter
	<u>Percent</u>	<u>Tons per acre</u>	<u>Tons per acre</u>
1 inch below and 1 inch to side	88	1.48	2.45
1 inch below (toe shield)	81	1.46	2.46
1 inch below (two separate openers)	89	1.26	2.22
Contact	70	1.27	2.45
Least significant difference at 5 pct level	15	N.S. <u>2/</u>	N.S. <u>2/</u>

1/ Partial list of treatments.

2/ Not Significant.

Table 2.- The effect of seed and fertilizer placement on stand and yield of Starr millet on a Tusquittee loam soil (bottomland) in 1962 1/

Fertilizer position with respect to seed	Stand 20 days after planting	Yield of dry matter at 5 weeks, 1st clipping	Total yield of dry matter
	<u>Per square foot</u>	<u>Tons per acre</u>	<u>Tons per acre</u>
1 inch below and 1 inch to side	12	1.36	2.84
1 inch below (toe shield)	19	1.78	3.09
1 inch below (two separate openers)	11	1.40	2.60
Contact	8	1.09	2.00
Least significant difference at 5 pct level	4	N.S. <u>2/</u>	N.S. <u>2/</u>

1/ Partial list of treatments.

2/ Not Significant.

SUMMARY

The toe-shield attachment is a simple device, suitable for mounting on double-disk opener-equipped drills, that will provide vertical separation of seed and fertilizer in the soil. By using this new design, manufacturers can offer farmers a means of applying seed and fertilizer with definite separation through a single-opener unit at a cost only slightly above that of drills presently available.